

PROTEIN HYDROLYZATES, PROCESS FOR PRODUCING THE SAME AND DRINKS AND FOODS CONTAINING THE PROTEIN HYDROLYZATES

This application is a 371 of PCT/JP01/01902 filed Mar. 12, 2001.

FIELD OF THE INVENTION

The present invention relates to protein hydrolysate, a manufacturing method therefor, and foods and drinks which contain the protein hydrolysate. In particular, the present invention relates to protein hydrolysate which has low antigenicity, and good emulsifiability, and to foods and drinks which contain this protein hydrolysate. In addition, the present invention relates to a manufacturing method for obtaining this protein hydrolysate at a high recovery rate.

DESCRIPTION OF THE RELATED ART

In recent years, there has been a trend toward increasing occurrences of food allergies and the importance of effective prevention and treatment of allergic incidence has increased.

With regard to incidence of food allergies, when infants ingest modified milk, modified powdered milk, or the like, the protein contained is sometimes absorbed into the body as it is in a state in which it is not sufficiently digested and still has antigenicity, and this is indicated as one of the causes for the incidence of diseases. For this reason, in order to prevent the incidence of allergic diseases in individuals who are believed to have a predisposition to allergic diseases, it is necessary for the modified milk and modified powdered milk ingested during infancy to have low antigenicity.

For this reason, conventionally, many protein hydrolysates which have a remaining antigenic activity of 10^{-6} or less have been developed by hydrolyzing a protein such as milk protein which is the antigenic substance, and reducing the antigenicity (for example, refer to Japanese Examined Patent Application, Second Publication No. Sho 54-36235; Japanese Examined Patent Application, Second Publication No. 62-61039; Japanese Examined Patent Application, Second Publication No. Hei 7-73507; Japanese Patent No. 2959747; and Japanese Unexamined Patent Application, First Publication No. Hei 8-228692). However, with regard to these protein hydrolysates, results for measurement of remaining antigenic activity using the sandwich ELISA method, which is a high sensitivity measurement method for remaining antigenic activity, show that the remaining antigenic activity is 10^{-7} or greater, and that some antigenicity remains (discussed below).

On the other hand, since the emulsifiability of proteins is reduced by a high degree of hydrolysis, there are the problems that in modified milk obtained using a highly hydrolyzed substance, the emulsified state of the fat globules in the milk cannot be maintained, and the fat globules aggregate and separate out. Thus, not only does modified milk in which the fat has separated out have a bad flavor and appearance, the absorption efficiency of the fat is low.

In order to overcome this problem, a protein hydrolysate which is superior in emulsifiability, which has a lower remaining antigenic activity, and which is obtained by hydrolysis of whey protein using three specific enzymes under specific pH conditions has been disclosed (Japanese Unexamined Patent Application, First Publication No. Hei 7-203844). However, the remaining antigenic activity of this hydrolysate is 10^{-5} , and therefore the antigenicity is not sufficiently reduced (discussed below).

In these day in which the prevention and treatment of incidence of allergy has become a serious problem, reducing the remaining antigenic activity to as close as possible to zero will reduce the risk of the occurrence of food allergies and will provide safe foods and drinks. In addition, it is extremely important as a social responsibility of food makers.

SUMMARY OF THE INVENTION

Objects of the present invention are to obtain a protein hydrolysate having improved emulsifiability and further reduced antigenicity, specifically, a remaining antigenic activity of the protein reduced to the detection limit of the sandwich ELISA method, and/or to improve the recovery rate of the protein hydrolysate with respect to the protein starting material.

The inventors of the present invention completed the present invention by repeated research on various methods of manufacturing protein hydrolysate, in particular, the hydrolysis conditions for various protein starting materials and combinations of porous synthetic adsorbents, and the characteristics of the obtained protein hydrolysates.

The protein hydrolysate of the present invention is a protein hydrolysate comprising at least two types of peptides, in which the rate of hydrolysis of the protein is from 30 to 45%, the number average molecular weight is 300 or less, and the ratio of the weight average molecular weight to the number average molecular weight is greater than 1 and 2 or less. This protein hydrolysate has reduced antigenicity and superior emulsifiability when compared with conventional protein hydrolysates.

The method of manufacturing the protein hydrolysate of the present invention comprises carrying out hydrolysis of a protein starting material to a rate of hydrolysis within the range of 30 to 45%, and bringing the obtained protein hydrolysate into contact simultaneously or separately with two types of porous synthetic adsorbent respectively having an average pore radius in the range of 2 to 8 nm and an average pore radius in the range of 20 to 30 nm, the total surface area of the two porous synthetic adsorbents being in a range of 300 to 3000 m² per 1 g (protein equivalent) of the obtained protein hydrolysate, and recovering the non-adsorbed component. Compared with conventional methods of manufacturing protein hydrolysate, the method of manufacturing the protein hydrolysate of the present invention is superior in its recovery rate of protein hydrolysate with respect to the protein starting material, and in the reduced antigenicity and improved emulsifiability of the obtained protein hydrolysate.

In addition, in this method of manufacturing, it is preferable for the porous synthetic adsorbents to be used such that the ratio of the surface area of the porous synthetic adsorbent having an average pore radius of 2 to 8 nm to the porous synthetic adsorbent having an average pore radius of 20 to 30 nm is in a range of 4:6 to 6:4.

The food and drink products of the present invention comprise the above-mentioned protein hydrolysate of the present invention. The food and drink products of the present invention can be made as food and drink products for the prevention of allergies, or as foods and drinks for allergy patients, and in particular, they can be made as modified milk or modified milk powders obtained from protein derived from milk as the starting material protein.

Consequently, additional embodiments of the present invention use the above-mentioned protein hydrolysate in foods and drinks for the prevention of allergies, and foods and drinks for allergy patients, and in the manufacture thereof.